The Canadian Builder and Carpenter

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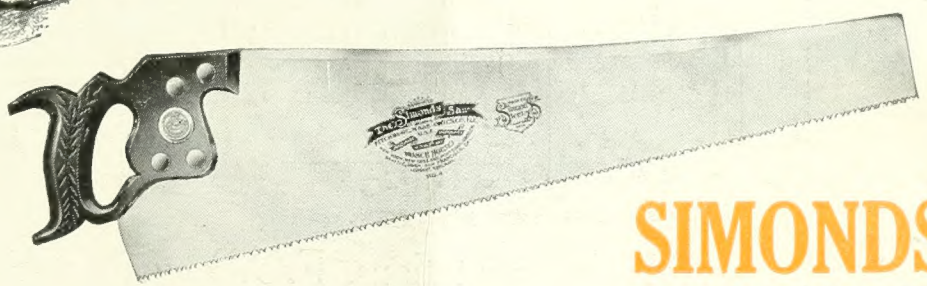

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the most satisfactory one to own. We make our own steel, and our exclusive tempering process gives the teeth a toughness and hardness which enable them to hold their quick-cutting edges, under long, hard usage. You can't keep saw teeth sharp if they are not tempered right, and a dull saw is almost worse than none.

Take the word of a man who has used a Simonds Saw. He will tell you which saw to buy. Ask your hardware dealer.

Remember Simonds Hack Saw Blades and Files are most efficient, Simonds Circular, Band and Cross-cut Saws are the American and Canadian Lumberman's accepted Standard.

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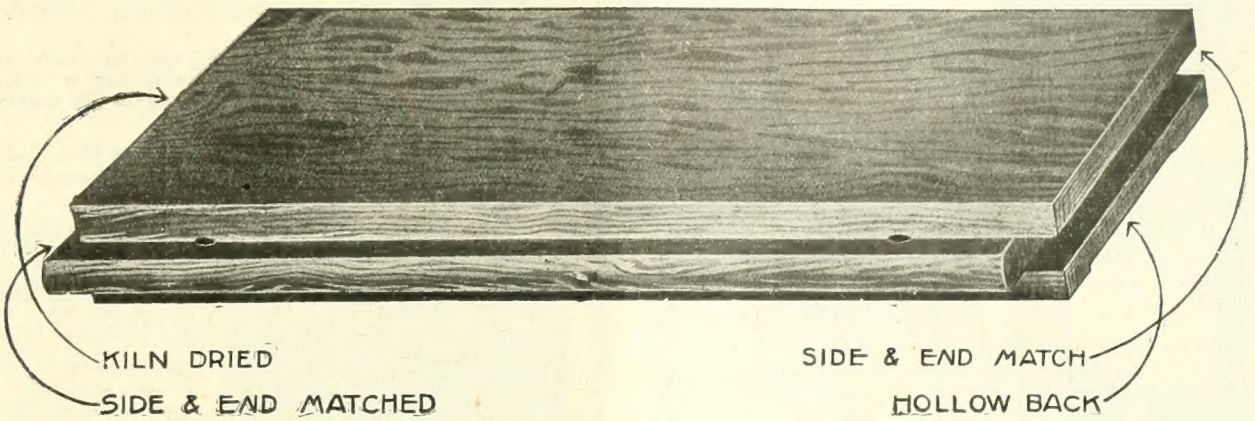
The Leading Stock Lines



What is the most noticeable wood-work in a room?

What good quality wood-work adds most to the general appearance of a room?

What is the most used and most abused wood-work, and what wood-work, if not of good quality, continually shows it? *Hardwood Flooring.*

Then, why not buy the best flooring, *especially when it costs no more?*

And, to get the BEST, you must buy from us—if not direct, look for our trade-mark on the back of each piece—and be sure you get it.

Our flooring is thoroughly kiln-dried, tongued and grooved, end-matched, hollow backed, assorted to lengths, stamped and tied with wire.

Each piece has our trade-mark on the back, which means that we guarantee absolutely.

The machining of the flooring is perfect. The workmen are experts, and work at the best machines possible to procure, under expert supervision.

MIDLAND

BRAND

This flooring is made in thicknesses of 3/8" and 13/16", Maple, Birch, Plain Oak and Quarter Cut Oak, and in 9/16 and 13/16 Beech.

This flooring has established a world-wide reputation for its appearance and service, and has been used in many of the large Public Buildings, as well as Residences throughout the country.

Now is the time to order your flooring. You will buy more cheaply during the next few months than probably during your life-time again. If you want to take advantage of this, send us your lists for quotations.

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VOL. 5 TORONTO, JUNE, 1915 No. 6

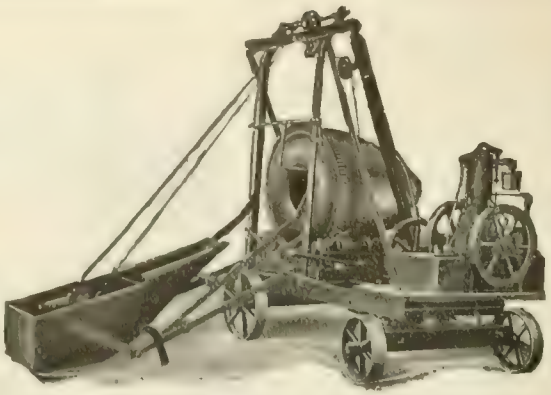
Editorial Contents

"Wettlaufer" Concrete Machinery

Wettlaufer Concrete Machinery has a good reputation all over Canada, whether it is the famous Heart Shaped Mixer, the famous Little No. O Power Mixer, the No. O Improved Hand Mixer, or the Brick and Block Machines.

These machines are built to give service, and the large number of satisfied users in all parts of the country testify to this fact.

Whatever it is in the line of Concrete Machinery you want, it will pay you to write us, and we will be glad to give you the advantage of our broad experience in the choice of a machine best suited to your requirements.

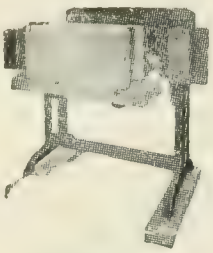


Wettlaufer Famous Heart Shaped Mixers

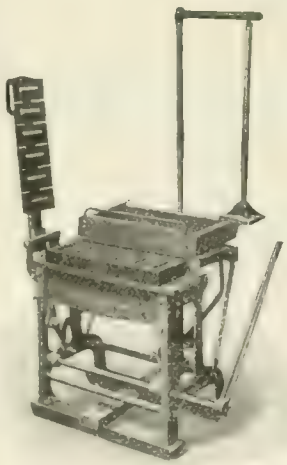
"Made in Canada"

Wettlaufer Concrete Machinery is made in Canada, and because for the same money we can give you a machine as good as, or better than foreign makes, there is every reason why you should support home industry and buy a Wettlaufer Machine.

Wettlaufer No. O Improved Hand Mixer



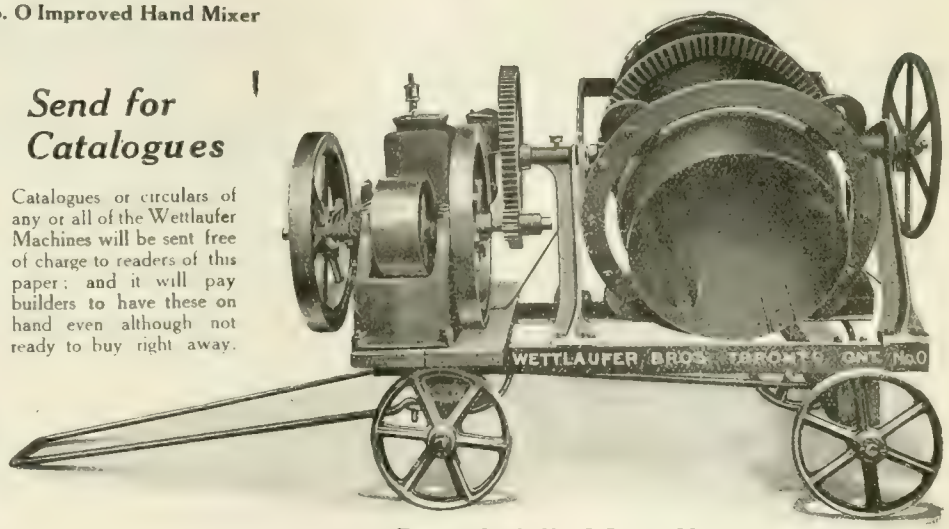
Wettlaufer Singer Block Machine



Wettlaufer Brick Machine

Send for Catalogues

Catalogues or circulars of any or all of the Wettlaufer Machines will be sent free of charge to readers of this paper; and it will pay builders to have these on hand even although not ready to buy right away.



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A. R. WILLIAMS MACHINERY COMPANY
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Front view of one of the cottage hospitals at the new Ontario Government Sanitarium at Whitby. Plans of the cottage hospitals are on the following page.

Plans of the Cottage Hospitals of the New Provincial Government Sanitarium at Whitby : :

By GORDON C. KEITH

This is the first of a series of articles on the cottage hospitals erected by the Ontario Government at Whitby. Future articles will deal with efficient construction methods which can be applied to the construction of any type of building.

ARTICLE I.

MANY schemes were adopted in the construction of the cottage hospitals of the new Ontario Government Sanitarium, at Whitby, which would be of great value to builders generally. Mr. S. A. Armstrong, the assistant provincial secretary, who had active charge of construction, is a student of Gilbreth, so that the methods used may have a little flavor of those adopted by the great efficiency expert in building construction.

In this article the plans of the cottage hospitals are given and succeeding articles will give some of the methods used in their construction.

In the farm where these buildings are located are 650 acres, the buildings and parks necessitating 150 acres. The park grounds border on Lake Ontario. There are two groups of eight cottage hospitals, arranged around a central dining hall, each cottage facing the sun. It makes rather a unique layout.

Hospitals are of Cottage Type

By breaking up the cottage or industrial groups into smaller units, resembling the ordinary dwelling house rather than a hospital ward, the use of a simpler and less costly type of construction is permitted.

The different buildings of the institution are grouped, each separate unit being planned and built with special reference to the requirements of the class of patients it is intended to receive, and by the elimination from this section of all patients requiring exceptional treatment, the administration will be less costly and more efficient.

For each hospital and cottage group a central kitchen is provided, with separate dining rooms attached, in order that the classification of patients arranged in the cottages may still be maintained in the dining rooms.

In addition, there is a power plant under construction. Full provision has been made for a water supply from Lake Ontario, with a filtration plant. A sewage treatment plant has also been installed.

Will be a Complete Community

The sanitarium will be a complete community, with administration building, acute hospital, isolation hospital, officers' and nurses' quarters, amusement hall, etc. None of these buildings will be more than two storeys and all will be fireproof, the necessary brick and hollow ware being supplied from the Government Brick & Tile Plant, at Mimico.

The buildings were designed by Mr. James Govan.

A Contractor's Seven Ages

The seven ages of a contractor under present conditions in the business may well be tabulated as follows:

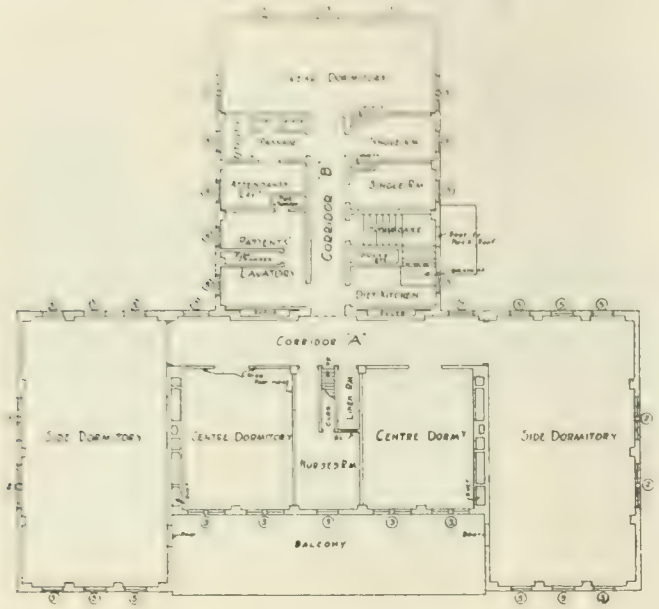
First Age—Joins the union.
Second Age—Wants to be a millionaire contractor.
Third Age—Goes into contracting business.
Fourth Age—Wants all the work in town at anybody else's figures.
Fifth Age—Gets his first big job.
Sixth Age—Goes broke on it.
Seventh Age—Re-joins the union.

Officers of Sand-Lime Brick Association

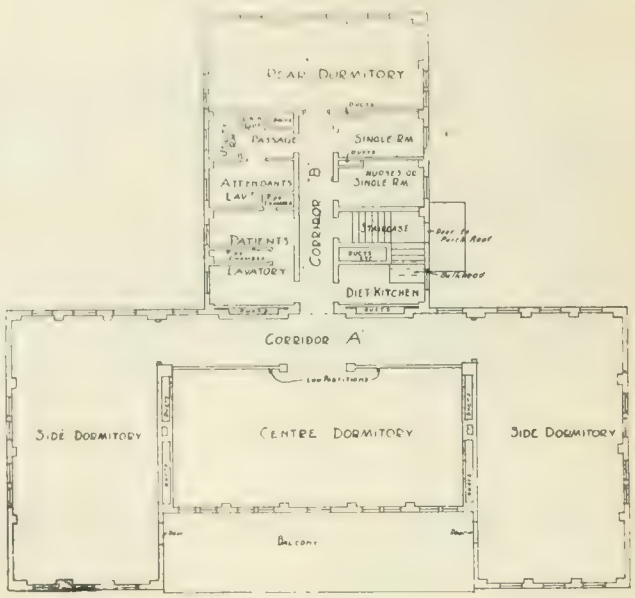
At the eleventh annual convention of the Sand-Lime Brick Association, held at Dayton, Ohio, officers for the ensuing year were elected as follows:

President.....W. H. Crume, Dayton, Ohio.
Vice Pres.....G. Sylvester, Calgary, Alta.
Secretary.....H. W. Terry, Toronto, Ont.
Treasurer.....J. L. Jackson, Saginaw, Mich.

The attendance represented a majority of the concerns that are successfully engaged in making sand-lime brick in the United States and Canada.

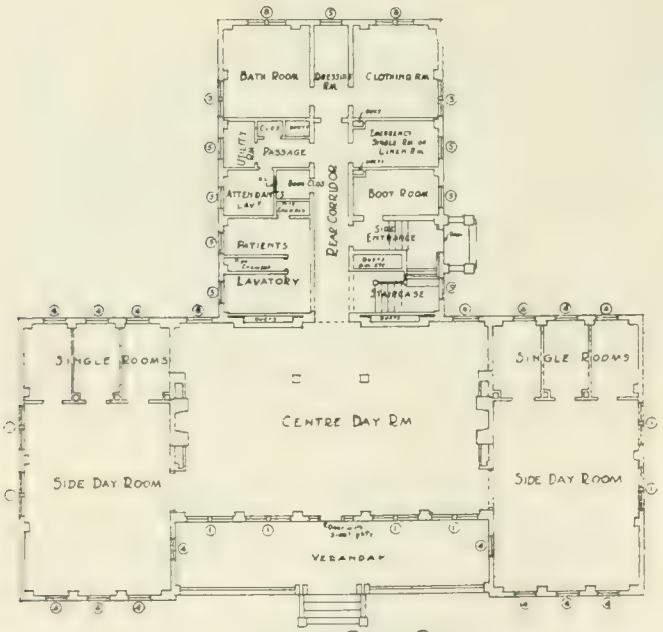


FIRST FLOOR PLAN
COTTAGES #1-2&3

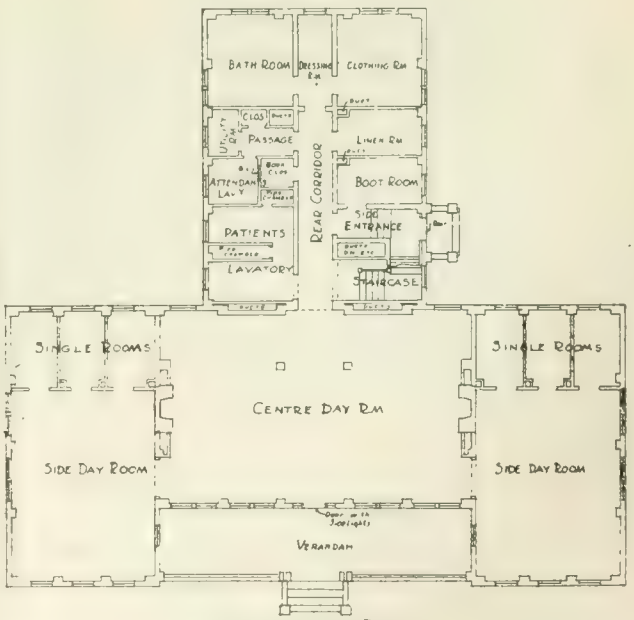


FIRST FLOOR PLAN
COTTAGES #3-4-5-6-7&8

NOTE
FOR WINDOW #1 SEE PLAN OF COTTAGES #1 2 & 3



GROUND FLOOR PLAN
COTTAGES #1-2&3



GROUND FLOOR PLAN
COTTAGES #3-4-5-6-7&8

NOTE
FOR WINDOW #1 SEE PLAN OF COTTAGES #1-2&3

Plans of the cottage hospitals of the new Ontario Government Sanitarium at Whitby.

Toronto's New Technical School, Where Subjects Relating to the Various Trades will be Taught

By A. C. McKAY, Ph.D.
Principal, Toronto Technical Schools

I AM very glad to take this opportunity of appearing before you, for I feel it is my duty, as head of the technical schools in Toronto, to keep in close touch with the manufacturing interests of the province. As you know, there has been a persistent call for technical education in recent years in this Dominion. The call has come none too soon. We are not all doctors or lawyers or preachers. There are some of us who are engaged in the industrial pursuits. In the past our educational efforts have been mainly towards the uplift of those who are not engaged in industrial work for those going into the professions.

I hope to speak a little concerning the school itself, but just in passing here, with reference to the upbuilding of the system, I may say that the present Central Technical School, now being equipped in this city, is being completed at an expense of two million dollars--none too great a sum, I think, when we consider the industrial interests of this community. We have been told that Canada is a great agricultural country, and so it is, but Canada is a greater manufacturing country at the present time. The president of the Board of Trade two years ago stated in public (and his statement was verified by reference to the trade reports) that the value of the manufactured products in the Dominion exceeded by far all that we obtained from the forests and the mines and the fields of this country. The manufactured products exceeded all those put together, and yet, until this present time, nothing of an educational character has been done to upbuild these manufacturing interests, especially in the way of education for industrial workers. The special Toronto proposition in respect to industrial education becomes this: Toronto is a great manufacturing city and is doing practically one-fifth of the manufacturing of the Dominion. The vast majority of the working population of Toronto, men and women, are engaged in industrial pursuits. The manufacturing in Toronto is unique in this respect, that it is not limited to one special phase of manufacturing. If you take the trade reports and examine the outputs of the various large cities you will be surprised to find some of these standing so well up in the list. Take Winnipeg, for example. They have a great sum to their record as to the value of their manufacturing output, but that sum is mainly due to the manufacture of flour. But in Toronto it is not like that. We have a great range of manufacturing; we have a great range of industrial workers, and, consequently, we need a special kind of industrial system. We have set ourselves here in the city the task of doing something for every individual industrial worker, as far as possible. In doing this it was necessary to build a large industrial school, in which we could give a fairly complete picture of the industrial life of the city. Consequently, we have this one great central building, associated with which we will have several branch schools.

Teaching Plans

I wish to give you an idea of the preparation we have made for industrial teaching in the central school. In order to carry out the project, as I have outlined it, it was necessary to build a great range of shops. Before speaking of this, let me call attention to this fact. The average industrial worker is not always as happy and contented in his life as he might be.

I have often thought that the professional man has a great advantage over his industrial fellow man. The former makes his choice of his life work after an experience that enables him to make an intelligent choice. We provide him with our great schools. He does not make his choice when he first enters the University, but later on. He decides to become a lawyer because, in that profession, he feels that he will make a success. The same with the doctor and others. This, in the past, has not fallen to the lot of the industrial worker. A great many men are clayworkers, because they got stuck in the mud some time. (Laughter.) Other men are carpenters because they just happened to get into the position. I think that if we can build up a system

Extract from an address before the Canadian National City Products Association.

Large new Technical School, Toronto, where provision has been made for courses in subjects relating to all the various trades, etc.

that will enable the industrial worker to make an intelligent choice of his industrial life that we will accomplish much for the general public. I think we can do that to a certain extent by building up great technical schools such as we are proposing in Toronto, where we will have a great range of work open to the inspection of the industrial boy. Consequently, we have adopted a scheme like the following in the city of Toronto:

We expect that the boy will come into our schools at the age of 13. We hope to keep him until he is about 17. This country can well afford to have its young boys in school work until the age of 17. The first two years of his life in the school he will be engaged on the general educational processes. He will have given to him the training that is to be obtained from the general educational subjects that have been used in the past. At the same time he will live in an atmosphere of shops, and at the end of his second year, after having a liberal course of mechanical drawing, elementary physics, mathematics, chemistry, and shopwork, he will be called upon, in consultation with his parents, to make his choice of a definite industrial trade. We hope to keep him to that particular trade he has chosen, and when he chooses to be a clayworker, I think we can do a great deal for him. In order to carry out this scheme in the new school, we are making great provision for industrial shops.

Shops for Those in the Building Industry, Carpentry, Brick, Cement, Plaster, Etc.

The building industry in the city is a great one and consequently must be represented liberally. We have seven wood-working shops. When I speak of a shop, I mean a room 60 feet long and from 28 to 32 feet wide. They are shops in the true sense. There are four metal-working shops, five brick, stone, cement and plaster shops, three electrical shops, three steam and gas engine laboratories, a plumbing shop, two painting and decorating shops, and several others.

Having decided to have these shops, we decided to place this educational work in the finest building we could afford. We have a magnificent building, 430 feet long by 230 feet wide, four storeys high; it is more than a mile around the hallways, with 27 acres of plastered walls.

Unfortunately, industrial life has been looked upon as a last resort for a man. I know this is true with a great many people. The boy who cannot become a lawyer or doctor or a bank clerk goes out into industrial life. This is not the view that I take, and I am happy to say it is not the view taken by the Board of Education of this city. It was decided to place this industrial work in the best educational building in Canada, and it is to this we invite the young man looking towards industrial life to come.

Work to be Done in the Building

Now, let me tell you what we propose to do in the building. I have already said that we invite boys to come there at the age of 13. I shall speak of only one course, the industrial course for boys. We propose to have the trade work done under the direction of the most skilful industrial mechanics we can obtain. We can afford to pay them. The prosperity of Toronto depends upon its industrial workers, for this is an industrial city. (Applause.)

In placing a man like that in charge, we must, of course, give him something to do. Part of his work will be with the regular boys who are in the day school, but, as I have worked it out, I find that he will have time for other things; and we propose, and have already made arrangements for part time at special classes, half-day classes, to which we will invite the industrial worker who is already at the trade. It may be during his slack time, it may be in the winter time, but we will be there to meet him, and in that way all our teachers will be kept employed.

Then, again, we have a third range of work in evening classes. At the present time, in our old school, we have nearly 3,000 people in attendance. Of these, about 500 are engaged in building trades. We propose to carry on this work also in the evening, and there will be evening classes for those in the building trades open throughout at least six months of the year.

Description of Building

In connection with our building, I should tell you that we have one great room in the centre, which is 80 x 40 feet and 35 feet high; we call it the construction room. In that room we propose to erect full-sized modern buildings. We propose to have all the trades represented in working on these buildings—sometimes the experienced worker, who will be there at the evening classes, sometimes the day boy. We propose to erect these buildings and, furthermore, we propose to manufacture in the building the brick and terra cotta that will be used in their construction. In fact, we propose to manufacture the clay products in our school and to teach brick laying in the finished structure. From these courses we also expect certain definite things to result. What could we expect these courses to do for the people who attend? In the first place the courses that we offer to the men may be expected to improve their general education. I think you will agree with me that that is desirable. Then, because of the fact that we are doing this in a great industrial building where so many sides of industrial life are represented, we think we can bring each trade into close touch with the other industrial trades. If a man is going to do well in his own particular line of work it is necessary for him to appreciate the fact that there are other lines of work and other people engaged in them. Then we will make him a better mechanic in his own line.

Can we really do this? I believe we can. A year ago a young man came to our school to be enrolled for evening work. He said he was a stonecutter. (We always question the people who come and try to help them as much as possible.) He said he felt that he could do something at decorative stone work. We thought probably the best thing we could do for him would be to put him in one of our modeling classes and give him the opportunity. In the course of a couple of months he produced a copy of a classic model of a head, and his instructors thought it well done for a person of his experience. So we encouraged him, and he asked permission to have a plaster cast of his model made that he might take it away with him. We made the cast and he took away the model of the head, and later on in the term he brought to us, cut out in stone, a copy of this model, and it was magnificent. I have it in my office at the present time. It is one of the finest things of the kind I have seen. During the last term this man still came on in our modeling classes, looking forward to advancement in his work. This year he was put in a class, modeling from life, and I would be proud to show you the bust that he has moulded of

an old gentleman whom we used as a model. He has developed wonderfully. In order to become a successful stonecutter one must have a knowledge of modeling. If we can do this for the stonecutter, we can do it for the clayworker.

Education on Laying of Brick

Referring to brick laying, it is an art that can be learned. I have seen some that is good, and more that is bad. In the construction of our building there was a little investigation concerning the character of the work that was being done. It was the character of the brick laying. It was not the character of the brick that was investigated, but the brick laying was at fault.

We propose to teach brick laying as an art, and it can be done. The brick laying will be related to the character of the brick being laid. Of course, it is necessary to lay brick in horizontal courses, but other things must be taught. Under the skilful bricklayer, whom we propose to get, we hope to do this work by skilfully handling the product that you make, and thus uplift the brick laying industry.

Useful Saw Information

In answer to a question, a writer in a recent issue of National Builder gives some useful information on the purchasing and care of hand saws. He says:

Saws, to begin with, have a disposition and body like people, and you must learn to handle them. A real hard temper is hard to get along with. Why? It wears out files faster, the points crumble, cuts no better nor longer.

A thick, heavy saw is like a big, heavy man. It's there with the lubber lift, but not for action. It cuts too wide a channel to work easy.

Don't pick a saw with that hard, fiery ring. There is a hand saw made now that will cut nails. Do you want to buy files to file a hack saw?

If you have a good temper and shape saw, that is rough and wavy on sides, and doesn't work good, as they sometimes don't, then remove handle, lay saw on smooth level surface, and give it a good finishing with a double emery stone and oil, first with coarse and then with fine side of stone.

A good soft brick and water is a good substitute.

Keeping a saw clean and smooth is half of its working easy.

Now filing is something you must train your eye to, and use your own skill. No device you buy will do it for you. Question best cutting points. Supposing this not to be the fastest cutting points (which are Briar tooth points) but general purpose saws. The shape of the teeth of the new saws is good enough, on rip and back saw, but for cut off I want more flem, and where it belongs on the front side of tooth, then it cuts like a knife, and not like a scratch awl. That is why. To do this, and not have that feather edge that breaks off right away, and leaves the tooth dull, file toward the handle of saw and tip the file over and file downward. The more the file is tipped the nearer square the back side of teeth will be, and the more flem will be on the cut side.

This is a little harsh on files, but you get a hard cutting edge from the start, and one that will wear. Why? Because you file against the cutting side of tooth, and leave no feather.

March Fire Record—A Large Increase in the Number of Small Fires

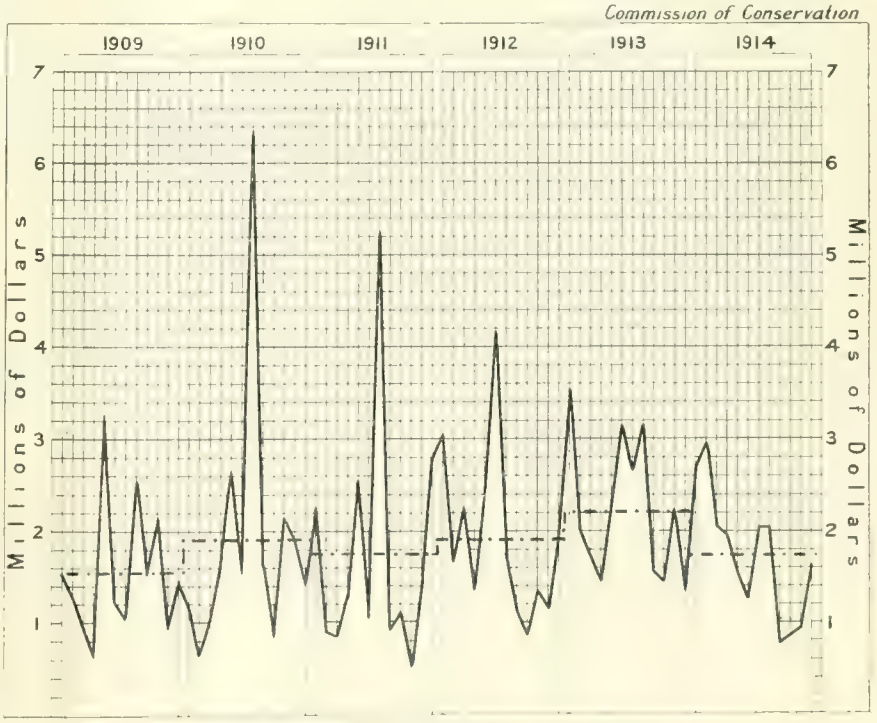
The Canadian fire record for March, of this year, is not one to be proud of. The year started well, and hopes were entertained that Canadians were going to make a considerable reduction in the fire waste. Compared with February the number of fires is as follows:

	Feb.	March
Fires over $10,000	24	20
Fires $1,000 and under $10,000	79	106
Fires $100 and under $1,000	187	198
Fires under $100	291	364
	581	688

It will be noted that the greatest increase occurred in the smaller losses. The conclusion to be drawn from this is that a large proportion of them were preventable, and were discovered and put out when still in their incipient stages.

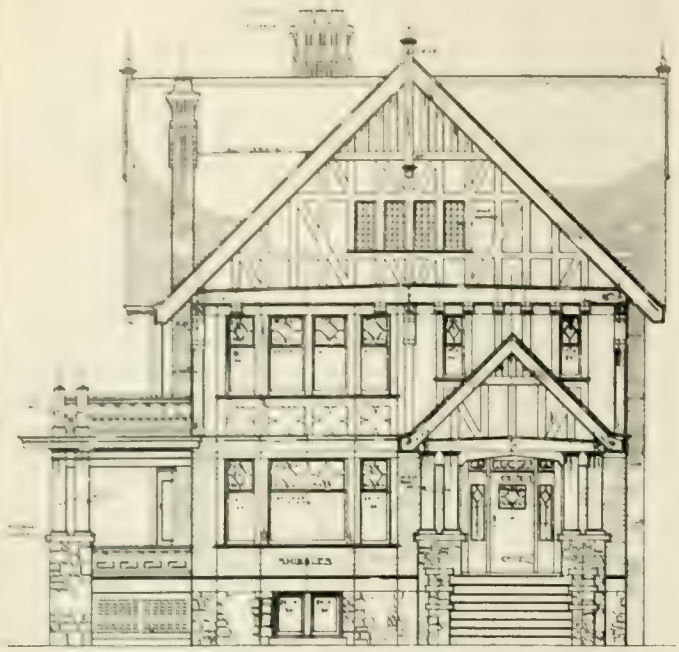
It is also a regrettable fact that during the month of March twenty-six persons lost their lives through fires.

The "hot box" is still charged with a good many mill and factory fires, yet with all the provision available for lubrication there is not much excuse for the hot boxes.



FIRE LOSSES IN CANADA, 1909-14

Average Loss Line shown thus . — . — .

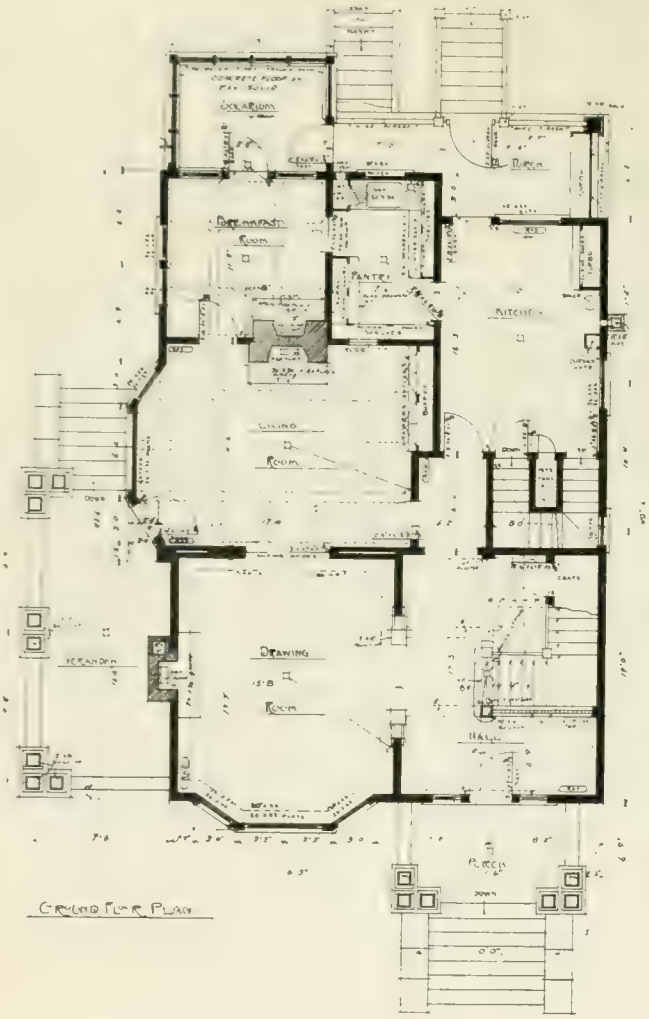


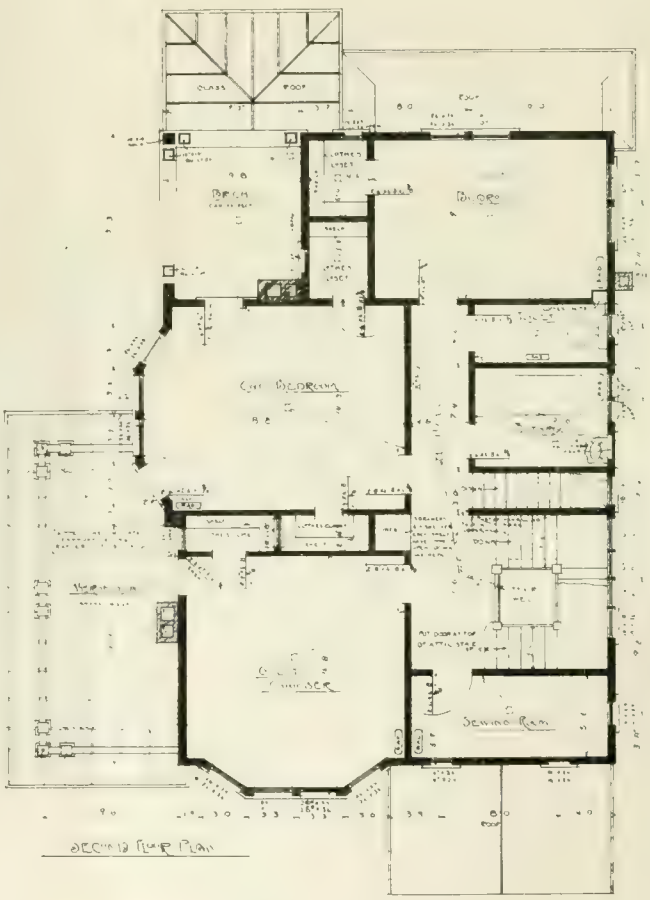
Residence of A. L. P. Hunter, Vancouver

Architects:
J. P. Matheson & Son, 532 Granville St.
Vancouver

THE accompanying plans show plans of a house of English style of architecture, designed for A. L. P. Hunter, 1306 Twelfth Ave. West, Vancouver, by J. P. Matheson & Son. The foundation consists of a 12-in wall below ground, faced with stone above ground. The first storey is shingled and the upper storey and gables are stucco.

As will be seen by a study of the plans, the house is a very convenient one, with many cupboards and closets, well-equipped pantry and kitchen. A solarium has also been provided. The house is 40 ft. 6 ins. long and 30 feet wide, with an additional verandah of 9 ft. 6 ins. The basement plan appears on the opposite page.





Making the Building Business Profitable

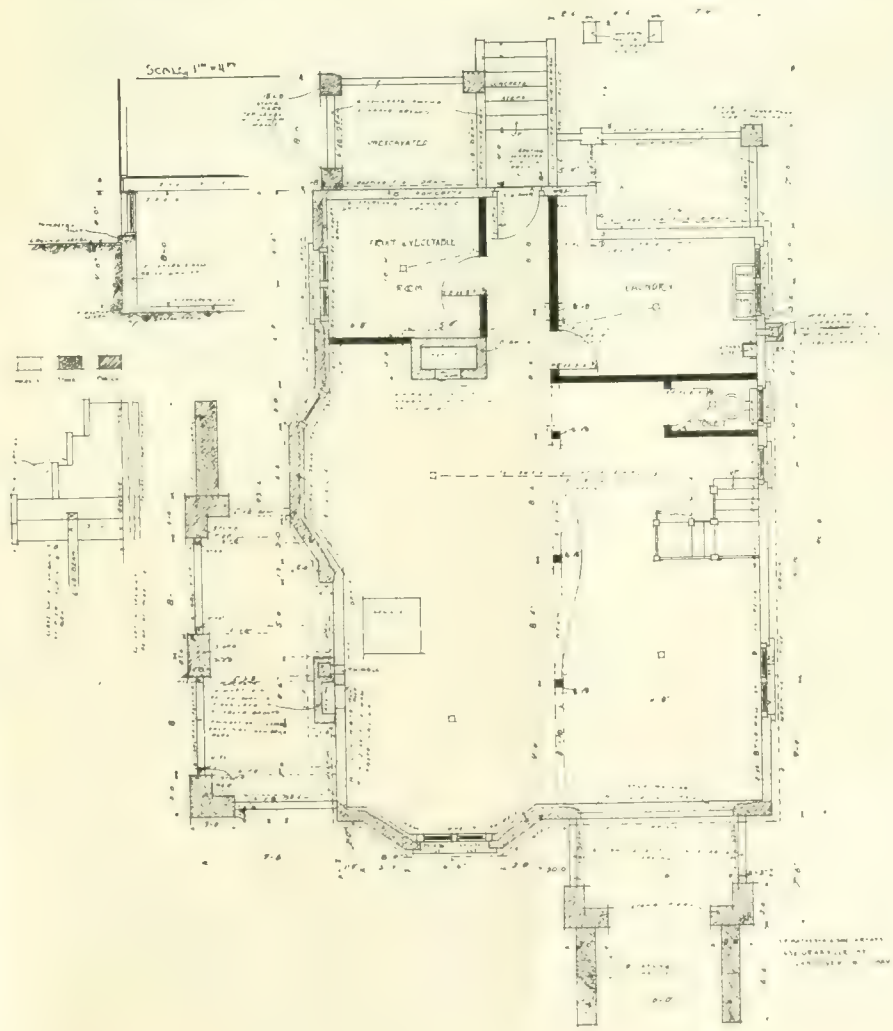
The success of a small builder's business is dependent to a large extent on his conducting it from the beginning on a sound economical basis, and the cause of many a downfall is undoubtedly the penny wise and pound foolish policy so often adopted by the man in a small way of business.

The first consideration of many builders is how much per hour they have to pay each workman, without any thought as to their skill at their particular craft. Such a narrow-minded view is at once fatal in the interest of true economy. While extravagance is not advised, often the penny and even more per hour paid to a skilled and experienced workman (instead of, as is so often the case, employing "improvers," who improve at the employer's expense) is money well spent. This sum on a week's work of, say, fifty-four hours, says Harrison Fielding, in the Building World, amounts to $1.10, and it is quite possible that to save this sum it costs the employer twice and very often thrice the amount. Experience means smooth working, and this again generally means a saving of time, so that a man may easily pay more than this in time alone on one job.

Then, again, the skilled man is usually much more economical in the use of materials, cutting them up and using them to much greater advantage. This is a point that cannot be too strongly emphasized, especially in these days of advancing prices. Lastly, the better workman makes less mistakes, with the consequent loss of both time and materials, to say nothing of temper.

True economy is not always directly connected with dollars and cents. For instance, there is another point which is not sufficiently taken into consideration. The small man, it is generally safe to assume, has at some time been an employe himself, and when he becomes an employer is often prone to be either too harsh and strict or too lenient in the supervision of his workmen. In the first case, he will practically degenerate into a veritable nigger-driver, which is not conducive to good work or a continuance of steady working when he is absent. In the second case, advantage is invariably taken of slackness on the part of the master. It is better, however, to be too strict than too lenient, and it is even better to be either thoroughly than to earn a name for indecision. For the employer who knows not his own mind is distrusted and disliked by all who have business with him, both clients and workmen. The ideal employer keeps a firm hand on every man

Residence of A. L. P. Hunter, Vancouver, B.C.



THIS plan shows the basement construction and a number of details. The walls are of 12-in. concrete and the floor is 4-in. concrete. A weeping tile surrounds the house. Separate rooms are provided for fruit and vegetables and for laundry. Chimneys are of brick on concrete footings.

The interior of this residence is in full keeping with the prepossessing look of the outside. The nine rooms are spacious, well lit by numerous copper leaded-glass windows, very nicely finished in selected fir and dark oak, and beamed throughout. The furniture is plain but substantial, there being several pieces of mahogany. The walls are decorated by several beautiful oil paintings. The floors are of hardwood and the whole interior is veneer paneled. There are several sleeping porches, a breakfast room, a solarium, and a large, well lit attic. The three fireplaces are artistically decorated, the one in the breakfast room being finished in brick.

in his employ, remembering, at the same time, that they are men with feelings like himself.

Purchasing Materials

In the purchase of materials there is a wider field for the exercise of the soundest principles of true economy than is generally realized by the small man. The successful builder with a large business is fully alive to this, and makes the most of every opportunity. It is often the grossest extravagance to buy stuff because it is cheap. Take the man who is constantly buying up lots of stuff at low prices: knotty, shaky, and split timbers often out sizes not specified by the average architect, and consequently giving a lot of waste in cutting; odd lots of drain pipes, mostly untrue, cracked, and generally defective, with the consequent condemnation by a straightforward and conscientious architect; brick and tile "seconds"—generally containing about 25 per cent. of usable (one cannot say sound) stuff; and so on ad infinitum. Has he ever taken the trouble to calculate the actual intrinsic value of his purchase, the loss through waste of absolutely unusable stuff, the extra time entailed working in the remainder—to say nothing of the too often making good after the job has been so-called "finished"? If he would only work out these details he would certainly see the utter folly of his method and drop all transactions of this kind.

Opportunities to Buy Cheaply

On the other hand, there are often opportunities of buying good stuff at a really cheap rate, and these should never be allowed to slip. Particularly is this the case in picking up sound second-hand stuff. For instance, architects and owners are only too willing to pay extra for old weathered and toned-down roofing tiles in preference to the garish hues too often seen on the roofs of new buildings. These old tiles must be bought up whenever come across, and not wait until they are actually wanted, or the builder will usually find they cannot be obtained except at high prices. In picking up little lots of old tiles as he comes across them the builder can always rely upon their being a profitable investment. This applies with equal force to many other articles that will occur to the shrewd man who knows his business.

Better Prices by Paying Cash

One often hears it said that the commercial prosperity of the country is based on credit; while not denying this in the broad sense of its meaning, it cannot be too strongly impressed upon the small man, the fact that he can always get better terms for cash; and if, as is too often the case, instead of going to the nearest builders' merchants with whom he runs an account, assuming that all wholesale prices are practically the same, he would only spend a little time with the small cost of postage in writing for competitive cash prices from two or three reputable wholesale firms, he would be much better off at the end of the year.

Accurate Accounts Must be Kept

There is one other point that ensures the working of a business on methodical and economical lines, namely, that it is absolutely essential that proper and accurate accounts be kept of all transactions, enabling the principal, whenever necessary, to put his finger on, and effectually check, all wastage. If the business is not sufficient to carry the regular employment of a capable bookkeeper, it will be found wise to engage someone who will undertake it in his spare time, say a few hours per week. There are plenty of thoroughly competent men who are quite willing to do this at a reasonable figure, the result of which would prove that he saves his money many times over in the course of a year.

A well-arranged and spacious verandah and balcony. The columns, etc., were supplied by Batts, Limited, West Toronto.

Record Cement Order for Canadian Concern

Probably what is the largest cement order ever placed on the American continent, outside of the Panama Canal contract, has been reported by Mr. F. P. Jones, general manager of the Canada Cement Company. According to Mr. Jones it amounts to 2,500,000 barrels. This is not exactly a war order but in its beneficial effects will be even better.

SOME ROOFING MATERIALS—Their Composition and Uses : : : : : :

BY
R. E. LINDSAY, B.A.Sc.

In this article, which is reproduced from "Applied Science," the organ of the Engineering Society of the University of Toronto, is given a host of valuable and interesting information on roofing materials, the ingredients that enter into the manufacture of the various classes, the advantages and disadvantages of each, and when and where each material should be used.

SOME roofing materials may be laid on any pitch except flat ones, while others are limited in use to nearly flat surfaces. It is highly important that the choice of covering be adapted to the pitch of the roof or vice versa. The lack of this adaptation is a prolific cause of leaky roofs. The selection of a certain pitch limits to a certain extent the number of possible materials that may be applied to it, and any consequent effect on expenditure must be borne as a result.

Location and atmospheric conditions. The type of roof to be used is very often settled by the location of the building with reference to the source of supply and the familiarity of the artisans with the material in hand. In this case the costs of securing and applying the material are the deciding factors.

Materials which are affected by corrosive gases should not be used without protection where they would be subjected to the action of these gases. Unusual climatic conditions may subject the covering to severe tests and hence should receive careful consideration.

If the building be so located that the walls of adjacent buildings extend higher than the roof to be constructed, the possibility of falling walls or debris should be considered. The Baltimore conflagration showed the necessity of this consideration..

Materials of Composition and Their Use

There are a large number of materials that are employed in the composition of roof coverings both singly and in combinations, and there is probably no roof made out of good materials in a workmanlike manner which does not find a satisfactory field for its use.

In the following discussion under the heading of the respective materials commonly employed in coverings, their use, application and characteristics will be briefly considered.

Wood

(a) Shingles—Long service has shown wooden shingles to have many good qualities for roofing purposes. However, the growing scarcity of good material for their manufacture is making it difficult to secure those of good quality. In some localities they can still be obtained, but their cost has advanced very rapidly

The durability of shingles is sometimes increased by dipping them in linseed oil or creosote. Efforts to do this by painting after laying have been made. It is true paint somewhat protects the surface of the shingle from cracking or warping, but it encourages decay below by closing the pores of the wood and preventing quick drying after exposure to rain or snow.

The chief disadvantage of shingles is their ignitability. In this connection the report of the National Fire Protection Association comments as follows: "Wooden shingles are the principal American conflagration breeders."

On account of the fire hazard of this roofing material their use in central parts of many cities is prohibited. In other parts the chief factors in their selection are their low cost and adaptability to small and isolated buildings.

(b) Sheathing—Of late the chief use of wood in roofs has been in the body of the covering or as a sheathing material. Being very adaptable, it is employed to suit many requirements.

Sheathing is usually made of a single thickness of planks, 1 to 3 inches thick laid close together. Matched and dressed lumber is used under all waterproofing materials except shingles, and it should be covered with some impervious material under metal, slate and tiles. The method of applying depends on the roof framework and whether the space directly under the roof is to be occupied or visible or not. When the conditions of loading and span are known the thickness required to carry the loads without excess deflection can also be determined from fundamental principles or by use of a simplified formula such as is given by Ricker.

The matter of deflection should receive careful consideration because not only is excessive springing unsightly, but it generally means interfering with the stability of the waterproofing material.

The following tables give the safe load in pounds per square foot for spruce plank of various spans and thickness for limited deflections:

Load per sq. ft. superficial	Span in feet 4	5	6	7	8
30	0.9	1.2	1.4	1.7	1.9
40	1.1	1.4	1.6	1.9	2.2
50	1.2	1.5	1.8	2.1	2.4

For Yellow Pine take 9-10 of thickness given above.

The inflammability of the material prevents its use in fireproof buildings. "The burning of wooden roof boards alone has proved sufficient heat to cause the collapse of steel roof trusses."

Attempts have been made to use fireproof wood as a sheathing material. The igniting point of the wood is raised slightly by impregnating its fibre with chemical compounds of which chloride of zinc, tungstate and silicate of soda are the most common. However, by this treatment the strength of the wood is sometimes affected. It is made more difficult to work with and the increased cost as estimated by Woolson is from $35 to $65 per thousand feet. Moreover, the presence of any perceptible amount of moisture, which is very likely to occur on the sheathing, induces the chemi-

cals to have corrosive action on metallic materials with which the sheathing may have connection.

Slate.

Slates are manufactured in various sizes, shapes and colors, and have a wide application. The best quality of slate has a hard surface, a bright lustre, and when struck with the knuckles has a clear ring. Softer slates give a dull sound when struck, absorb water and hence are liable to break in frosty weather and the nail holes wear, causing the slates to loosen. The color of the slate does not appear to indicate the quality.

The chief merit of slates is their durability. They are fireproof as far as the flying brand is concerned at least, and do not collect dust or dirt.

The various colors and sizes can be utilized to produce good architectural effects. The largest size usually means the cheaper roof, but the smaller ones give the best appearance.

The main disadvantages to slate are its tendency to crack when walked upon or subjected to excessive heat, its conductance of heat and cold, its weight and expense. The last mentioned is usually the most important of these.

Slates may be laid directly on boards, battens, or on purlins. The punching of holes for fastening should be carefully done and copper wire nails should be used for fastening. The lap is a very important part of slating and should be selected to suit the gradient of the roof. The standard lap for suitable pitches for slate roofs is three inches.

Clay Tiles

Waterproof roofing tile is made in a great variety of shapes and colors. Those of good quality are substantial and fireproof, require no painting, and are non-conductors of heat and electricity. They should be well burned and be so made that they will not absorb moisture. Semi-vitrified or glazed tiles are the most durable and impervious. Glazing consists of giving the exterior surface a coating which at the temperature required for burning is converted into a glass-like mass. In addition to rendering the tile more impervious, it serves to decorate it. A combination of ornamental shapes and colors can be used to present a more pleasing appearance than can be secured with other coverings.

There are two general types of tiles, flat and interlocking, the former being laid in cement and sheathing, while the latter frequently is laid directly on purlins. Of these two kinds, those which interlock are considered to give the most satisfactory roof from a practical standpoint.

Glass tiles are made in the same shape and size as the usual ones and can be used where skylight is desired without breaking the uniformity of the roof surface.

Tile roofs are costly, not only in regard to the tiles, but also in regard to the additional strength required in the supporting trusses or framework by reason of their weight. However, tiles are becoming much cheaper and a better grade is being produced, so that an increase in their use may be anticipated.

Non-waterproof hollow burnt clay blocks or tiles are sometimes used as a base for some waterproofing material.

A kind of hollow book tile (so called because of their shape) is used. They are supported by inverted tees set as rafters, embedded in mortar between the tiles. They are heavy and expensive, but give a good type of fireproof construction.

In addition to the above uses of clay tile, those of the ordinary soft clay variety are sometimes used in insulating roofs. They are hollow, two or three inches thick, and assist in giving a very good type of insulation.

Again, ordinary clay tiles are used as a protection to what is called built-up roofs. They do this to good effect, affording a high resistance to fire.

Fibre and Materials Necessary for Its Use

Fibrous roofings may be divided into two classes. (I.) Built-up roofs. (II.) Ready roofings.

Among these two general types there are many varieties which generally take their name from the kind of protective coating or waterproofing compound used for the fibre. While many materials are in the composition of both of the above types, the methods in which they are employed are quite different.

Built-up roofs, as the name indicates, are made from various materials directly on the roof. They consist of from three to six layers of saturated felt laid on the roof, cemented together, and coated with some kind of pitch and protected by slag, gravel, tile, or cinders embedded in the coating.

There are two kinds of pitch used for coating and cementing, which give use to two types of built-up roofs, (I.) Tar. (II.) Asphalt.

Coal tar pitch from the distillation of bituminous coal is considered the best of the tars for roofing use. It contains some water, various impurities and free carbon, which, after the water has been removed, is ordinarily from 5 p.c. to 35 p.c. of the total. The percentage varies with the method of manufacture and the coal used.

Free carbon is generally considered to be a valuable adjunct to roofing tars, as it renders the material less affected by changes in temperature and it does not interfere with the saturating power of the felt.

Commenting on the matter of tars, the report of the A. R. and M. W. A. states—The best practice allows the use of nothing but "straight run" pitch.

Asphalts, as found naturally, are not suitable, even after the impurities are removed, being too hard and brittle. This is ordinarily remedied by softening or fluxing with various oils.

The fluxes should be sufficiently staple to insure against too rapid hardening of the fluxed asphalt. They should be free from deleterious constituents and should be of such character that they will combine with the asphalt to be fluxed so as to make a homogeneous and perfect solution. Poor fluxing hastens the loss of the elasticity and bending power of the compounds and with age allows them to become brittle and hard.

With skill in compounding, based on a thorough working knowledge of the materials used, asphaltic compounds can be prepared of natural asphalt and oil residuals with valuable qualities for roofing purposes.

A brief comparison of these two bituminous roofing materials might here be made.

Both can easily suffer from adulteration and poor preparation, but the asphalt seems to be more liable to this. From the chemist's viewpoint asphalt is the safer material because it is less subject to changes when exposed to weather. However, the use of some oils for fluxing may make the asphalt more liable to internal changes. The coal tar pitch is cheaper, can

be depended on for better results, and hence is more extensively used.

Felts

The felts used in built-up roofs simply constitute a medium for holding the pitch material in place. Nearly all felts are made of rag stock and should have a certain amount of wool to give them saturating power. In using asphalt absorbent power is the main thing desired, while in using coal tar pitch this quality is not so necessary. Very good results are obtained by using about five thicknesses of felt if the other materials are up to the mark. They are used in various proportions to get different results and to meet variations in the materials used.

Top Finish or Protective Coating.—A coating of some material is necessary to hold the top mopping of pitch in place, to protect it from the sun and from the action of the elements, and to give the covering some fire-resisting value. Gravel, slag or crushed stone is commonly used for this urpose. It should not be too coarse or too fine or contain sand or dirt, to give the best results. Where the roof is to be subjected to wear, high

Residence of Mr. Innis, Waterdown, Ont. The columns on the verandah and balcony are 12 in. in diameter and 8 ft. high. These were supplied by Batts, Limited, West Toronto.

fire resistance is required; and where the character of the construction warrants the expense, flat tiles or brick should be used.

As the materials used for cement and coating will melt and run under the heat of the sun, the use of this type of covering is limited to flat or nearly flat surfaces. If used for steep slopes greater thickness of materials is required, and they, consequently, necessitate greater expense.

Skilled workmen are necessary for the application of these roofs, and as the chances of poor workmanship are many thorough inspection is required.

Ready Roofings

There are innumerable prepared or ready roofings which ordinarily are obtained in rolls with the cement and nails necessary to apply them. They vary from a very light felt with the cheapest possible saturant and enough sand or soapstone coating to prevent sticking in the rolls, to a sheet so heavy that it cannot be rolled, built up of heavy felts and strengthening materials, and saturated and protected also by carefully prepared compounds, and possibly protected also by a coating of crushed stone. Their durabilities and fire-resisting values vary to as great a degree.

Prepared roofings may be divided into two general classes: (1) stone surfaced; (2) smooth surfaced.

The stone surfaced are to a certain extent an adaptation of the built-up roof. The protective coating must be of materials uniform in size. The amount that can be used is limited to the amount that can be rolled or that can be held on a certain pitch of roof.

The smooth-surfaced roofings are usually coated with some finely-divided material, to prevent sticking in the roll. This must be stable and not easily affected by changes of temperature. Blown oils are frequently used for this purpose. To get the best life frequent recoating or painting is necessary.

Asbestos, magnesia, asphalt rubber, felt or some similar material forms the basis of both these types. Many of the roofings made from these materials make excellent coverings. They can be placed quickly by unskilled labor and on almost any slope of roof.

They are of value for small and isolated buildings and for temporary structures where a roof of long life is not necessary. They are weak in that with narrow lap and a large part of the roof covered with but one layer of material a single defect can cause a leak. Another chance for trouble is their tendency to stretch and wrinkle and the difficulty of laying them absolutely tight and flat.

In making selections the reliability of the manufacturers, service tests, and cost should be the governing factors. To depend on guarantees does not give satisfactory results.

Miscellaneous Fibrous Products

(I.) Sheathing paper is manufactured by impregnating straw, wood pulp or mineral fibre with hydrocarbons or some cementing compound. It is used under many of the common roofing materials to assist in keeping out moisture, heat, cold, wind, etc., and in some cases to assist in preventing radiation and condensation. Good paper should be tough, impenetrable by

air or water, of uniform quality, and be clean to handle.

(II.) Insulating quilts are of the same general composition, but are much heavier. They usually consist of two plies with some fibrous material between the plies. These quilts are laid between the sheathing and the waterproofing materials. They are not positive insulators but afford a cheap means of fulfilling the requirements of insulation for some cases.

(III.) Asbestos sheathing and protective metal are products which in properties somewhat resemble corrugated iron. They are made up of cement, asbestos, and some reinforcing mesh or sheet metal. The product has considerable fire-resistant value, is durable and waterproof, and has in its composition materials which are generally considered necessary to give wood characteristics to a material. They are light and strong, have a high first cost, but no maintenance expense. The materials are laid in the same way as corrugated iron.

(IV.) Asbestos shingles are made of asbestos and cement by means of a press. The materials used give them some of the characteristics of wooden shingles and make them durable and fireproof. They seem to have most of the qualities necessary for a roofing material and appear to render good service. They have a high first cost, but no maintenance.

General Notes on Roof Coverings

The following table compiled from various sources gives the latest desirable pitch for different roofing materials:

Material	Rise in 12 in.
Wooden Shingles	6 in.
Slates, ordinary	6 in.
Clay Tiles (interlocking pattern)	7 in.
Clay Tiles (ordinary)	3½ in.
Corrugated Iron	4½ in.
The Crimped Steel	2
Steel Roll Roofing	2
Tin and Terne Plate	1
Copper	1½
Lead and Zinc	1
Concrete	Flat
Built-up Roof—	
Tar and Gravel	½
Asphalt	½
Ready Roofing	1
Asbestos Shingles	3

Weights

The following table from Tyrrell's Mill Buildings gives the total loads per square foot of roof surface for different kinds of roofing.

Roof Covering	Lbs. per sq. ft.
Corrugated iron, unboarded	8 to 10
Corrugated iron, on boards	10 to 12
Slate on laths	12 to 15
Slate on 1½ in. boards	15 to 18
Tar and gravel	10 to 12
Shingles on laths	8 to 10
Tile on plank	20 to 30
Tile laid in mortar	25 to 35
Sheet metal on boards	7 to 9
3 in. reinforced concrete	40 to 45

Costs

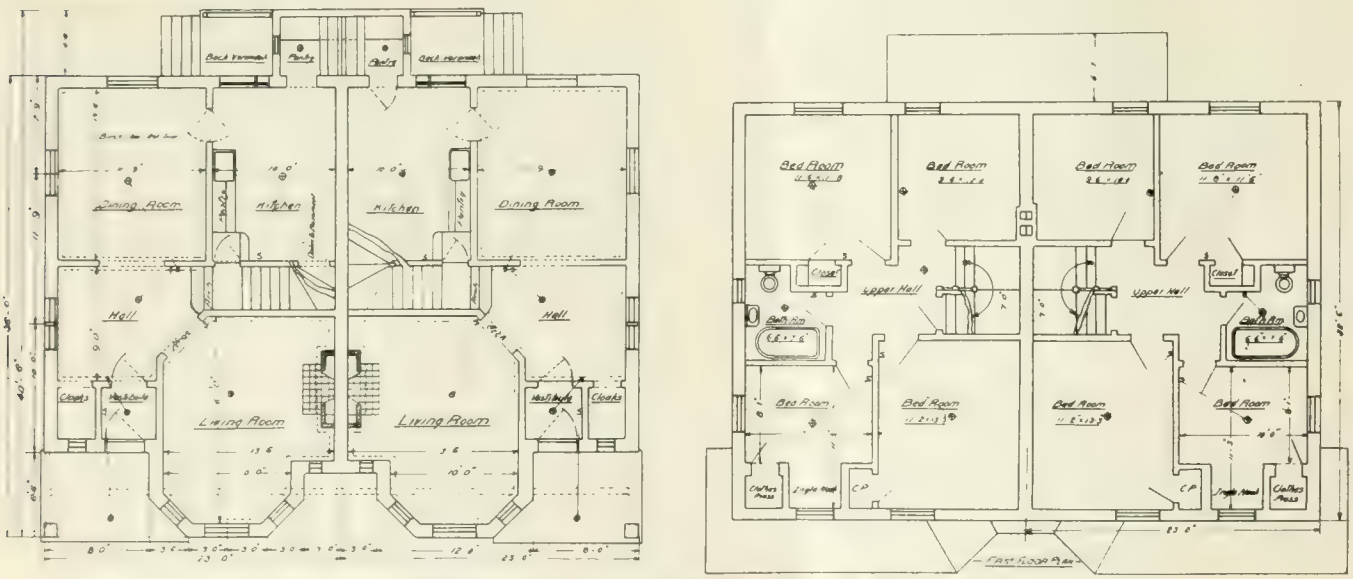
The great variety of roofing materials and different qualities of these makes possible wide differences in the cost of a covering for a building. Moreover, the requirements of the building and the extent of the fulfilment of these have direct effects on the costs. Consequently any cost data that might be given would only be approximate and this can be obtained in cost data handbooks.

There is quite a lot of attention being turned now toward what is termed the knock-down or ready-made house. Some mail order concerns are doing quite a business in furnishing material cut to exact size for house construction. If the interest continues, it probably means that jobbing planing mill men will find themselves called upon to get out framing, siding and much of the material that comes into house construction, to exact size, in shook form, ready to put up.

Well-Designed Houses in Montreal Suburb

This pair of houses, shown on the right of the illustration, is located in Montreal West, in a locality known as "The Town of Asbestoslate," so called because of the fact that the majority of the dwellings are roofed with Asbestoslate shingles.

This type of house is ideal for suburban districts. The long, sloping roof at the front, which continues on



Floor plans of a pair of well-designed houses in one of Montreal's suburbs. See opposite page for elevation.

over the verandah, gives an appearance that is both pleasing and effective.

There are several features about the layout which are worthy of mention and which are clearly outlined in the plans. For instance, there are two pantries. Instead of having the usual wide balcony at the back, one end of it has been cut into to make room for a pantry. The smaller balcony is not likely to be particularly noticed by the occupants of the house and, even if it was, the added room in the kitchen would overcome this objection.

Coal Chutes and their Practicability

Perhaps the best argument that can be given in favor of built-in coal chutes is the fact that five years ago they were practically unknown, while to-day there are several hundred thousand in use. This rapid growth has come, not because of any special effort made by coal chute manufacturers, but from the long-felt need of giving protection to the coal room window. As far back as the days of our grandfathers this need was felt, evidenced by the fact that all sorts of makeshifts were used to prevent damage being done to building through the delivery of coal. So with this actual demand already established, it is only necessary to produce a coal chute that will efficiently serve its use at a moderate cost, to insure its practicability. However, let us determine, if possible, the attitude of the building owner toward a built-in coal chute.

Increases Selling Value

From the standpoint of a building owner it is true that a coal chute is a very small item in the construction of a building; but the pride of every man is touched when it comes to the appearance of his property, and a coal room window that has become broken and marred with the surrounding wall blackened with coal dust is certainly very undesirable. Furthermore, when a building is offered for sale a coal chute installation will tend to increase where an unprotected coal room window in need of repair will decrease its value. There is absolutely no way of preventing the coal room window from becoming an "eyesore" without giving it adequate protection, for the coal men have long been appealed to without results.

The cost of a built-in coal chute is a point that would at first appear to be a hazard to their practicability, but because of the many different types, and their costs, ranging from five to twenty dollars, now being put on the market, there is a coal chute to fit the pocketbook of the most economical builder. Again, the list price of a coal chute is by no means the true cost, for where a built-in chute is installed, the window frame, sash and glass are not necessary, which means an initial saving of from three to five dollars on the coal chute investment.

Furthermore, there is an actual saving in a coal chute installation during the entire life of the chute (which in the majority of cases is longer than the life of the building) inasmuch as the building owner is not continually put to expense in keeping his coal room window in repair. This is a very important item when it is remembered that every time coal is put into a coal bin enough damage can be done by a careless coal man to necessitate repairs being made. With the present high cost of labor and material it takes but a very few repair bills to more than equal the cost of a coal chute.

Architects are Specifying Them

At the present time fully 60 per cent. of the architects are specifying built-in coal chutes in drawing up plans of their buildings, for they have been quick to recognize their advantages and efficiency in protecting the coal room window. The contractors have also recognized the value of coal chutes and are recommending them at every opportunity.

Coal chutes as a product are fast coming to the front and are being classed with the large number of the newer building specialties which go to make up the more modern buildings, and the time is close at hand when they will go into every building erected, thus becoming a staple building material—Rock Products.

Dwellings in "the town of Asbestoslate," a suburb of Montreal. Floor plans of the pair on the right appear on the opposite page.

New Line of Fibre Wallboard

Fibre wallboard will make a good job of any building construction, but it is of particular value when used for summer residences.

The Martin Corrugated Paper Co., Toronto, has recently entered into the manufacture of fibre wallboard and are turning out an excellent product. This board is made smooth on one side and somewhat rougher on the other, and one good point about it is that either side may be turned out. The advantage in this is that say a builder wants a rough finish on a dining room, he turns the rough side out. In the case of a drawing room, where an enamel finish is desired, the smooth side is left to show. Then, too, graining effects may be produced on the rough side.

While the makers do not claim that their board is absolutely fireproof, they do state that, on account of the chemicals used in its construction, it will greatly retard the progress of a fire.

Some Advantages Claimed

Some of the advantages claimed for this product are that it is sanitary and can be washed with a damp cloth or painted over again, even in a different color. It cannot crack, and improves with age: it will stand as long as the house stands.

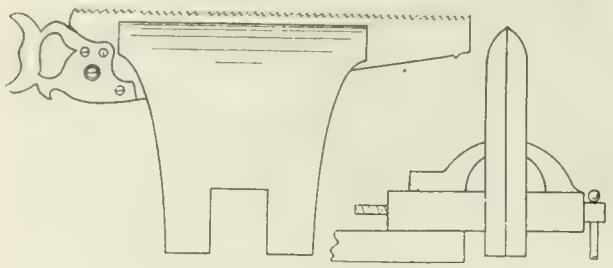
If a hole is accidentally made in a wall, it is not necessary to tear around the hole and have the usual muss made by plaster. The panel containing the hole is simply removed and a new one inserted and painted to match the others.

Martin wallboard is about 3-16 in. thick, and is furnished in widths of 32 and 48 inches, and in 6, 8 and 10-foot lengths. Special sizes are cut to order.

The makers have a good proposition to offer to live agents in all parts of Canada.

Unique Saw Filing Vise

The saw vise shown herewith is a device that has been in daily use by the writer for several years, and is now considered an almost indispensable feature of the filing bench. It can be made of any well-seasoned



Unique saw filing device.

hardwood (this one was made of birch) and of any size to suit the convenience of the user. About 14 in. long, 8 in. high and 3 in. thick, including both jaws, is a convenient size. In it any saw, from a panel or bucksaw to a "two-man" cross-cut, may be easily handled. When the job is finished the jaws may be removed and the vise is free for any purpose desired.—W.C.N., in The Wood-Worker.

Safe Ladders

In using a ladder, first, see that it is good and strong; second, be sure of the floor or ground on which it is to rest; then place it square in position and proceed with your work.

A ladder should be used only in the way that was intended by the manufacturer. A stepladder, for instance, should not be used without completely extending its folding legs.

In placing a ladder of any kind, great care must be taken to see that it cannot slip.

While working on a ladder, indoor or out, we should carefully avoid throwing or dropping tools to the floor or ground below. A considerable number of accidents occur each year, in which people are injured by tools, etc., being dropped, accidentally or otherwise, by workmen on ladders.

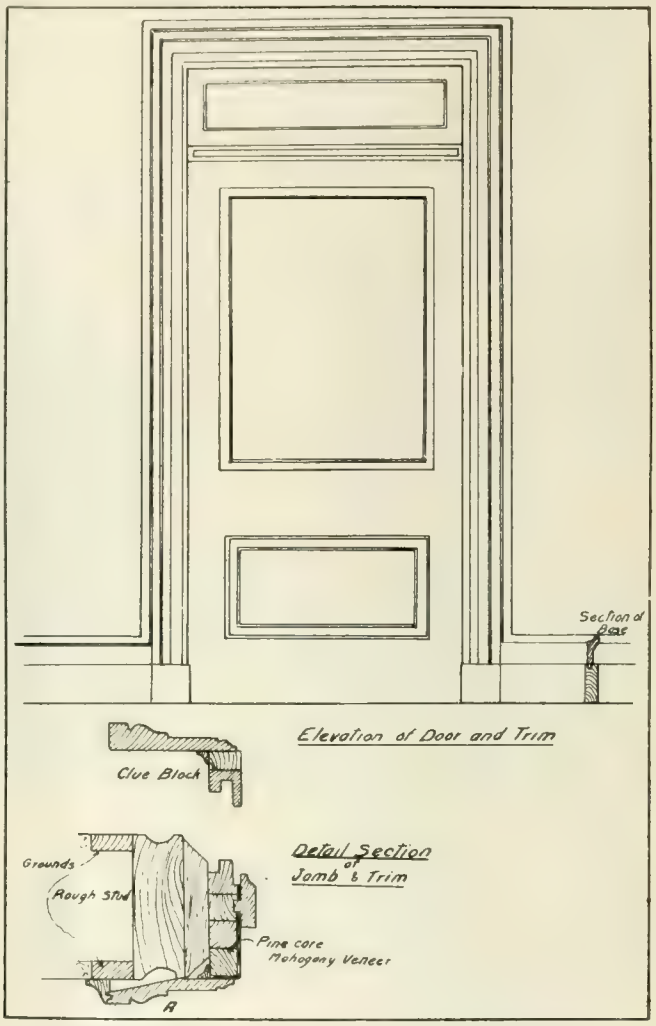
Another dangerous practice is to leave a ladder resting in working position while doing some other work.

Bell Telephone News.

Fixing Door Jamb and Trim Together

The door jamb and trim shown in sketch are set and fixed at the same time, being built together. They are so made that they come apart, being grooved and tongued behind the stop. The stop is glued and nailed from back.

In setting, the half rabbeted for door is set first and nailed to backing, nailed through tongue and edge of jamb. Trim is fixed with toe nails to ground. The



Sketch showing how to fix door jamb and trim together.

other half is then placed into position and by means of hand screws drawn together and fixed to backing.

The trim on the office side of the door is backed off and a groove run to receive the tongue of the core moulding, as shown at A on sketch. This core is screwed on. This allows concealing of bell or telephone wires, which may be brought along behind the base, up and over doorway. The base is in two members, with top part fixed with screws, so that it can be removed for wires. Trim is of mahogany and jamb is mahogany veneer on pine core. This was used on a large bank building and had a very good effect when finished.—Geo. Shaw.

News of Builders' Exchanges

News of Halifax Builders' Exchange

Mr. Robert Robinson Black, secretary of the Halifax Builders' Exchange, has written The Canadian Builder & Carpenter an interesting letter, as follows: Building operations have an encouraging tone just now, and the prospects are that there will be a general improvement from now until the season closes. The value of building permits issued at the office of the city's engineering department during April totals $150,000. This figure is the topnotch value of permits for any single month since the middle of the building season last year, and is

Four-pint sterling silver pitcher donated by Henry Disston & Sons as one of the trophies for the golf tournament of the Manufacturers' and Distributors' Golf Association at Philadelphia, June 3 and 4.

exceedingly encouraging. On account of the war building operations have been greatly restricted, comparatively no large contracts having been awarded. Operations have been principally in the erection of residences. A scarcity of money has compelled prospective builders to defer carrying out their plans until the market brightens up, and this is not likely to be very noticeable until the war is over. This is the view of leading real estate dealers and contractors.

I might also add that the result of the civic elections gives our exchange reason to be well proud of the citizens, inasmuch as the mayor for the ensuing year is one of our members and directors—Mr. P. F. Martin, of the firm of Martin & Moore, house painters and decorators, of this city.

Mr. Martin has, on previous occasions, filled the office of alderman, and it speaks highly for his reputation as a civic administrator to be now, out of five prominent candidates, the one selected to fill the mayoralty chair.

Besides the mayor, the exchange feel proud of two of the aldermen selected, being also members of our exchange, Mr. J. E. Godwin, of the firm of Macdowney & Godwin, plumbers and tinsmiths, in this city, and secretary of the Master Plumbers' Association; also Mr. W. G. Foley, of the firm of Foley & Son, stonemasons and contractors.

You can also observe from the report of the first meeting of controllers that things look good and indicate quite a lot of work and city expenditure in the right direction.

A Workmen's Compensation Act, on the lines of the Ontario Act, although materially altered, has been put on the statute books. It only goes into force on proclamation by Governor-in-Council. So far it is not in shape to meet with the general approval of employers of labor here, and the principal complaint being that there is no demand for it, the present Nova Scotia Act being good enough and sufficient for the purposes here.

Banquet at Guelph Exchange

At a banquet held recently by the newly-organized Builders' Exchange, Guelph, Ont., a provisional committee was organized, with J. Occomore as chairman; Mr. W. P. Colwill, secretary; and the following members: Messrs. G. E. B. Grinyer, W. Cowan, R. Williams, A. Reynolds, J. J. Mahoney, C. Butler, W. G. Howell, H. Occomore, W. W. P. Colwill, and J. Baetz. A number of interesting addresses were given during the course of the evening. Mr. George Gander, of Toronto, vice-president of the Toronto Exchange, and Secretary A. E. Flower, of the provincial association, were two of the speakers.

Ceresit Water-Temple

The Ceresit water-temple stands in the Palace of Machinery at the Panama-Pacific Exposition. In this exhibit the architect, Mr. E. B. Brown, of Stockton, Cal., has successfully accomplished the difficult task of combining beauty with utility.

The fountain at the pinnacle of the water-temple pours a constantly flowing stream of water over the cement dome, and this water runs along the eaves and then down through the eight supporting pillars of the temple to its base, from which point it is pumped back to the roof again.

There are plate glass inserts in each pillar, and the

Ceresit water temple which stands in the Palace of Machinery at the Panama-Pacific Exposition.

interior of each is lighted with concealed electric lights, showing a miniature Niagara between walls of ceresitized cement, while the roof of the same material further illustrates the effective and permanent waterproofing qualities of Ceresit.

A semi-indirect electric light gives a restful and pleasing effect inside the temple, while the drinking fountain in the centre rejuvenates the tired and dusty sightseer.

The Ceresit water-temple stands 16 feet high and is

a prominent feature among the many exhibits in the Palace of Machinery

Hydro-Electric Heating of Buildings

In a recent issue of the Ontario Gazette, incorporation papers were announced as being granted to the Hydro- Electric Radiation, Limited, with a capital of $500,000, to manufacture, install, or in any other way handle and sell radiators, electric heating, electric steam producing radiators, and other forms of heating.

A representative of this paper called at the offices of the Hydro-Electric Radiation, Limited, in the Traders Bank Building, Toronto, and in an interview with the Vice-president, Mr. H. C. Long, was shown some very interesting data and viewed in working order two types of the new electric steam radiator. For purposes of showing to the public there were arranged upon an ordinary table two types of radiators, one being the ordinary square steam radiator in use in the ordinary home to-day, and the other one was a type of wall radiator usually used in bathrooms. The square radiator had a capacity equal to heat a 10 by 12 room. This radiator had an attachment, consisting of a little cylindrical boiler, which is imbedded in the bottom portion of the radiator by having portions of three of the radiator joints taken out, allowing the boiler to set into the radiator, thereby not destroying the contour of the radiator in any manner. This little boiler is arranged at a predetermined level at the bottom of the radiator and through a little water cock in one end of the radiator there is inserted to the radiator proper about a quart of water. The little boiler is attached to the radiator on the under side with a small pipe and in the upper portion by another small pipe. This allows the water to run through the lower pipe from the radiator to the boiler, and the water so running into the boiler fills it to the same level as it is in the radiator.

Immersed in the water in the bottom of the boiler is an electric heating unit of small capacity, properly insulated, capable of rapidly converting the small quantity of water in the boiler to steam. It will be noted that as the heating unit is entirely within the boiler, all the heat developed there must be transmitted to the water direct.

The wires are connected from the radiator by means of an ordinary plug, such as is used on electric iron, etc., to an ordinary electric plug in the baseboard of the room. The current being turned on passes through these electric wires and immediately boils the little amount of water in the small boiler. This naturally gives off steam, which steam escapes from the little boiler into the radiator through the top pipe which connects the small boiler and the radiator. Therefore, with a minimum amount of current, there is continuously generated an amount of steam, which eventually heats all of the water in both the boiler and radiator to a boiling point, and the steam arising of course fills the radiator, making it equally as hot as can be produced by any steam heating apparatus now in use.

Radiators are Independent Units and are Portable

Each radiator, of course, is an individual unit, and as they are arranged on wheels, they may be taken from one room to another at the convenience of the householder, and during the warm days of summer can be run into a store room, leaving the sitting room or other rooms in the house absolutely free of the unsightly radiators the majority of homes are now blessed with.

Mr. Long stated that the cost of installation of this new system, taking an eight-roomed house as a basis and putting in twelve radiators, would be approximately fifty per cent. of the cheapest heating installation in use to-day. This can be easily realized when by the new installation they do away with the furnace and the many feet of stand pipes, fittings, etc., that are necessary in connecting together the apparatus now in use for heating the ordinary house. The new radiator has the appearance of an ordinary radiator.

Each radiator has connected to it a thermostat, which in turn controls the temperature of the room, and a person can set their thermometer at sixty or seventy degrees, and two degrees of excess heat above that point will automatically turn off the electric current, while two degrees below the set point will automatically switch it on.

The radiator from its time of installation need never be looked after or touched in any way until it is removed in the spring.

Cost of Operation

The cost has been reckoned and figured down very thoroughly, the following figures being furnished by the company. The radiator capable of heating an ordinary ten by twelve room burns 250 watts per hour. This, if burned continuously for twenty-four hours, would mean 6,000 watts, or six kilowatts of power. And the new rate card of the Toronto Hydro-Electric System gives a rate of .6 of a cent per kilowatt, which in turn is subject to ten per cent. discount, making the cost for heating purposes practically one-half a cent per kilowatt. One radiator, therefore, burns approximately three cents' worth of current per day, and in an eight-roomed house, where there are fourteen radiators, the cost would be approximately 42 cents a day. If we now figure a winter of seven months' duration, or 210 days, the cost would be approximately $88.20. But many days during September, October, April and May the average householder only needs heat for an hour in the evening in only one or two rooms. Therefore, even this price can be cut down very considerably by the person who does not waste current.

Against this, stated Mr. Long, we have an eight-roomed house with the twelve radiator system, which burns approximately twelve tons of coal in the season, and perhaps a couple of cords of wood. Then there is a great amount of coal shoveling, cinder sifting, and the necessary looking after that is entailed by the average furnace, to say nothing of the trouble the housewife has in removing coal dust from every article of furniture throughout the house. Coal costs the average householder seven and one-half dollars ($7.50) per ton in Toronto, and 12 tons makes $90.00 for coal alone.

There being so little water in both boiler and radiator, it can be allowed to freeze solid, and in fact last New Year's Day it was allowed to do so and was started from solid ice. The current can be arranged so that extra amounts can be used if heat is desired instantly and can then be cut to the regular rate of consumption later.

Everybody admits that team work is a great thing, but too many want to be the team and have the other fellows do the work.

House Building of Canadian Indians

Few builders probably give much thought to the potential needs of the Indians of Canada in the way of housing accommodations. Yet these potential needs are gradually increasing.

There is in Canada an Indian population of 100,000. Last year the Indians erected 2,057 buildings of various descriptions. Most of the dwellings were of frame construction, the number of this kind being 429. Next in order was log dwellings, of which there were 410. Of outbuildings there were 324 horse stables and 229 cattle stables.

According to the Department of Indian Affairs the value of the private dwellings erected during the year was $354,422, bringing the total value of their buildings up to $4,309,777, and of public buildings, $1,172,372.

A steady improvement characterizes the dwellings of the Indian population of Canada. The one-roomed log shacks are fast disappearing, and in their place stands a good class of buildings, with shingled roofs, large windows and separate bedrooms.

Education is making the Indian a more valuable, as well as a better citizen. W. L. Edmonds.

Occasional reports of injury from bursting emery wheels come as sad reminders that there is too much reckless work around these high-speed tools.

It is not the fresh sawdust about the mill and factory that makes the fire danger so much as the dry, fine powder dust that settles in the nooks and corners and is left undisturbed.

Catalogue Review

Lambie Interchangeable Steel Forms—The Lambie Steel Form Co., 299 Broadway, New York, have issued a booklet showing houses constructed with Lambie forms. It also describes and illustrates the use of these forms.

Protecting Structural Steel—The Cement Gun Co., 30 Church St., New York, have issued a folder describing the protection of steel by a thin coating of gunite.

Marvel Double Disc Floor Surfacing Machine

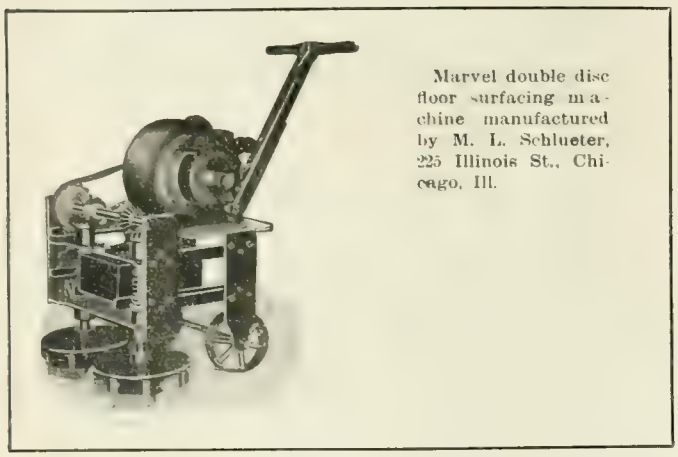
The "Marvel" double disc, ball-bearing floor-surfacing machine is designed and built to withstand the hard usage required of floor surfacing machines. It has large capacity, producing level floors at low cost.

Each disc is independent of the other, which, with the ball thrust bearing and springs between the journals, causes the machine to conform to irregularities in the floor, thereby securing the greatest possible grinding and smoothing results.

It can easily be moved from one floor to another and requires only one man to operate.

The machine can be connected to any switch at a very low cost for power.

The beveled gears, sprockets and construction of machine are built to stand the strain of 100 per cent.



Marvel double disc floor surfacing machine manufactured by M. L. Schlueter, 225 Illinois St., Chicago, Ill.

overload. All material used in machine is of highest grade. Machine parts are easily accessible. Each machine is thoroughly tested and actual work done with it before it is shipped.

The "Marvel" is so constructed that by tilting it backward all of the weights of machine rest on large traction wheels.

This machine has two discs, each disc consisting of four carborundum blocks 2x3x4, giving 72 square inches of cutting surface, revolving at a speed of 225 revolutions per minute towards each other, throwing the muck and grit towards the centre, thus avoiding splashing against walls, baseboards, openings, etc.

It is self-controlling, giving operator time to treat the floor. When in operation it is very easy to move backward and forward, and will surface close to wall. Discs extend beyond the front and sides of machine two inches.

Two 12-inch discs, connected directly to vertical driving shaft, revolving in opposite directions, having universal couplings applying the pressure directly in the centre of the disc.

Ball bearings take the load of machine, reducing friction to a minimum, and no loss of power. The average saving over babbitt bearings is from 35 to 65 per cent.

Gears at end of vertical shaft above ball bearings are made of semi-steel. Tool steel sprockets connecting gears with vertical shaft reduce speed from motor to horizontal shaft.

The manufacturer of this machine is M. L. Schlueter, 225-7 W. Illinois St., Chicago, Ill.

New Catalogues of the Polk System

Two new catalogues have been issued by the Polk-Genung-Polk Co., Fort Branch, Indiana, U.S.A.

One of these catalogues is 36 pages, with many illustrations showing actual installations. It refers to the economy of the silo, the story of the silo, the story of concrete, concrete silo construction, the high silo, the Polk system, etc. In it are useful tables showing capacities of round silos and acreage required to fill and minimum amounts that should be fed daily, and many silage facts.

The second catalogue deals with the Polk system of reinforced monolithic concrete construction for grain storage, water tank, silo, coal pocket, smokestack, and similar circular concrete construction. Many photos are reproduced and details of manufacturing this type of construction are given. Much useful information on silos, tank quantities, etc., is also included.

BUILDING PERMITS FOR APRIL

Eastern Cities

	Apr. 1915	Apr. 1914	Four months 1915	Four months 1914
MARITIMES—				
Halifax	$ 131,100	$ 183,425	$ 251,488	$ 326,090
St. John	26,750	72,300	64,950	164,500
Sydney	3,850	13,140	8,410	18,405
QUEBEC—				
Maisonneuve	7,200	230,000	31,600	667,000
Montreal	973,891	2,205,970	1,865,827	4,061,166
Westmount	40,100	99,730	44,400	140,870
Quebec	173,468	350,127	668,451	790,519
Outremont	13,800	144,000	.....	.....
ONTARIO—				
Brantford	27,170	90,735	55,900	152,745
Chatham	13,250	22,917	52,400	31,867
Galt	20,325	45,020	38,235	75,055
Guelph	33,960	95,910	91,735	245,924
Kingston	35,987	62,609	56,614	111,944
London	116,250	417,505	223,135	630,665
Ottawa	185,125	710,725	313,650	1,348,175
Port Arthur	17,042	142,148	33,676	587,861
St. Catharines	34,396	58,057	92,947	223,642
Smiths Falls	400	16,900	875	25,600
Toronto	790,309	3,114,888	1,569,590	7,713,573
Welland	10,452	98,124	55,032	156,195
Windsor	8,445	156,900	106,220	372,375
Peterborough	14,400	98,015	23,117	182,480
Berlin	57,825	120,385	66,150	252,525
Woodstock	13,270	30,452	24,635	42,977
St. Thomas	19,810	68,470	31,410	141,331
North Bay	20,815	50,250	24,290	75,575
Total 26 Eastern cities.	$2,789,390	$8,698,702	$5,796,737	$18,489,059

Western Cities

MANITOBA—				
Brandon	$ 7,300	$ 56,275	$ 11,375	$ 82,045
St. Boniface	31,935	70,915	31,935	155,515
Winnipeg	426,75[illegible]	2,808,900	505,150	5,648,500
ALBERTA—				
Edmonton	40,725	750,922	111,675	1,360,297
Lethbridge	4,910	16,040	30,645	115,725
Red Deer	100	4,600	600	24,725
Medicine Hat	28,855	140,320	42,670	396,060
BRITISH COLUMBIA—				
Vancouver	31,754	254,166	302,791	1,296,604
Oak Bay	850	57,076	10,950	150,876
Kamloops	200	13,790	4,620	79,110
New Westminster	4,400	23,140	19,585	49,435
Victoria	21,100	661,020	52,575	1,319,415
Prince Rupert	4,250	31,320	11,850	497,320
SASKATCHEWAN—				
Regina	7,005	408,100	21,290	564,850
Weyburn	3,675	127,650	6,090	129,550
Total 15 Western cities.	$ 613,809	$ 5,424,234	$1,163,741	$11,870,027
Grant total, 41 cities...	$3,403,199	$14,122,936	$6,958,478	$30,359,086

(Courtesy of Financial Post.)

Price List of Building Materials—Revised to Date

EDITOR'S NOTE—Great care is exercised in obtaining prices for this department. They are as accurate as it is possible for us to make them. We know, however, that because of varying conditions, different dealers' prices are bound to vary somewhat; and our purpose in publishing this department is to give readers an idea of prices, rather than absolutely definite information.

In some cases a range of prices appears. This is given to cover the variation in quotations given by different dealers, and also to cover slight variations in conditions of measurement or purchases, which space will not permit us to specify in detail.

We will be glad to give readers prices on materials not appearing here (hardwood flooring and hardware trim for instance), and also the names of dealers from whom such materials can be obtained. Such information will be supplied promptly if you write us specifying in detail what is desired.

PRICE AT MONTREAL

Hemlock Lumber

2 x 4 in. to 2 x 12 in., 8 to 14 ft.	$24.00
2 x 4 in. to 2 x 12 in., 16 ft.	26.00
2 x 4 in. to 2 x 12 in., 18 ft.	28.00 to 30.00
1 in. hemlock No. 1	22.00
No. 1 hemlock decking	23.00 to 25.00
No. 2 hemlock dimensions and 1 in.	26.00 to 30.00

Pine

1 in. common and better pine 8 to 12 in. wide, rough	$32.00 to 40.00
2 in. white pine, mill stock	29.00 to 33.00
⅜ x 8 and 10 in. pine shelving	36.00 to 45.00
⅞ x 12 pine shelving	42.00 to 50.00
No. 1 white pine flooring	40.00
No. 1 spruce flooring	30.00
No. 1 pine decking, D2S	40.00
No. 1 pine V. or beaded sheeting	40.00
No. 2 pine V. or beaded sheeting	30.00

Pine Trim for Paint Finish

4 in. casing, per 100 ft.	$1.75
5 in. casing, per 100 ft.	2.10
8 in. pine base, per 100 ft.	3.25
10 in. pine base, per 100 ft.	4.20
4 in. pine window stool, per 100 ft.	2.75

Shingles, Lath Roofing, Etc.

No. 1 pine lath	5.00
No. 2 pine lath	4.50
No. 1 spruce lath	4.00

Cedar Posts—Fence

5 in. at small end	5c. foot
7 in. at small end	7c. foot

Hardware

Nails, wire, common	$2.30 base keg
Nails, cut, common	2.50 " "
Sash weights, cast iron	1.50 per 100 lbs.
Tarred felt paper	.43 roll
Building paper	.35 roll

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	17.00
No. 1 dry pressed buff bricks	21.00
Red stock bricks	11.50
Grey stock bricks	12.00
Wire cut brick for foundation work	10.00
Fire brick	25.00
Sewer pipe, 4 inch	10c. foot
Sewer pipe, 6 inch	15c. foot

Price at Montreal—*Continued*

Cement, Plaster, Stone, Etc.

Cement (bags extra)	1.90 bbl.
Sand, for cement or brick work	.95 ton
Lime	.38 per 100 lbs
Hydrated lime	10.00
Mortar color	5.00 bbl.
Plaster of paris	2.35
Crushed stone 2 in.	1.40
Crushed stone, 1 in.	1.60
Crushed stone, ⅜ in.	1.75
Hardwall plaster	$9.50 to 12.00 neat 6.50 sanded ton
Gravel	1.35 yard
Hair (plaster)	.03 per lb.

PRICE AT TORONTO

Hemlock Lumber

2 x 4 in. to 2 x 12 in., 8 to 14 ft.	$21.00 to 29.00
2 x 4 in. to 2 x 12 in., 16 ft.	21.00 to 29.00
2 x 4 in. to 2 x 12 in., 18 ft.	24.00 to 30.00
1 in. hemlock No. 1	22.00 to 26.00
No. 1 hemlock decking	24.00 to 28.00
No. 2 hemlock dimensions and 1 in.	18.00 to 23.00

Pine

1 in. common and better pine 8 to 12 in. wide, rough	$25.00 to 33.00
2 in. white pine, mill stock	29.00 to 34.00
⅜ x 8 and 10 in. pine shelving	33.00 to 40.00
⅞ x 12 pine shelving	45.00 to 48.00
No. 1 white pine flooring	34.00 to 37.00
No. 1 spruce flooring	27.00 to 32.00
No. 1 pine decking, D2S	26.00 to 31.00
Spruce decking	27.00 to 32.00
No. 1 pine V. or beaded sheeting	35.00 to 39.00
No. 2 pine V. or beaded sheeting	30.00 to 33.00

No. 1 Common Yellow Pine

2 x 4 in. to 2 x 14 in., 10 to 16 ft.	$24.00 to 36.00
2 x 4 in. to 2 x 14 in., 18 to 20 ft.	29.00 to 38.00
2 x 4 in. to 2 x 14 in., 22 to 24 ft.	31.00 to 40.00

Yellow Pine Finish

4/4 x 6, 8, 10 and 12 B. & B. smoke finish	$41.00
5/4 x " " " "	45.00
6/4 x " " " "	45.00
8/4 x " " " "	45.00
4/4 x " " " steam finish	45.00 to 50.00
5/4 x " " " "	48.00 to 50.00
6/4 x " " " "	48.00 to 50.00
8/4 x " " " "	50.00 to 55.00

NOTE TO READERS. We would be glad to have suggestions from readers as to the extension or modification of this list.

Price List of Building Materials—*Continued.*

Price at Toronto—*Continued*

Pine Trim for Paint Finish

4 in. casing, per 100 ft.	$1.80 to 2.00
5 in. casing, per 100 ft.	2.00 to 2.50
8 in. pine base, per 100 ft.	2.75 to 3.25
10 in. pine base, per 100 ft.	4.00 to 4.50
4 in. pine window stool, per 100 ft.	3.00

Hardwood Trim, Flooring, Etc.

Quotations will be given on request. See editor's note above.

Shingles, Lath Roofing Etc.

XXX B. C. cedar shingles	$3.35 per M
N. B. extras	4.00
No. 1 pine lath	5.00 to 6.00 per M
No. 2 pine lath	4.75 to 5.00
No. 1 spruce lath	4.25
Roofing	1 ply—$1.60 per sq.
	2 ply— 2.00 "
	3 ply— 2.40 "

Cedar Posts—Fence

5 in. at small end	.25 each
7 in. at small end	.50 each

Hardware

Nails, wire, common	$2.35 cwt.
Nails, cut, common	2.95
Sash weights, cast iron	2.00
Tarred paper	.60 roll
Building paper, plain	.50

Glass

United inches	Star	D.D.
Up 25 (per 100-ft. box)	$6.50	8.60
26-40	$7.00	10.00
41-50	7.40	11 70
51-60	8.00	12.00
61-70	8.75	12.75
71-80	9.50	13.85
81-85	10.50	17.50
86-90		18.85
91-95		19.20
96-100		22.75
101-105		32.00
106-110		36.00

Less 20 p.c. F.O.B. Toronto.

Wired glass ..... 18c. to 20c. per sq. ft.

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	$14.00 to 18.00 pr M
No. 1 dry pressed buff bricks	14.50 to 18.00
Red stock bricks	10.00 to 12.50
Sand lime brick	8.50
Grey stock bricks	10.50 to 12.50
Sewer brick	8.75 to 9.50
Wire cut brick for foundation work	8.00 to 9.00
Porous terra cotta bricks	12.00 to 15.00
No. 1 enamelled bricks, all colors, from	80.00 to 150.00
Fire brick	26.00 to 30.00
Sewer pipe, 4 inch	10c. foot
Sewer pipe, 6 inch	16c. foot
Verandah post caps, 16 in.	1.45 each
Verandah post caps, 20 in.	1.75 "
Chimney caps, 1 flue in 1 piece	2.00 "
Chimney caps, 2 flues in 2 pieces	3.50 "
Chimney caps, 3 flues in 3 pieces	5.00 "

Cement, Plaster, Stone, Etc.

Cement (bags extra)	$1.85 bbl. (1.55 in car lots)
Sand, for cement or brick work	1.20 a yard

Price at Toronto—*Continued*

Lime	.38 cwt.
Hydrated lime (Canadian)	10.60 ton
Hydrated lime (American)	11.60 "
Mortar color	black, 3; red, 2
Plaster of paris	$1.50 to 2.50
Crushed stone, 2 in.	1.20
Crushed stone, 1 in.	1.25
Crushed stone, ⅜ in.	1.25
Hardwall plaster	9.10
	5.00 sanded
Gravel	1.50
Hair (plaster)	.07 lb.

PRICE AT WINNIPEG

Hemlock Lumber

2 x 4 in. to 2 x 12 in., 8 to 14 ft.	$29.00
2 x 4 in. to 2 x 12 in., 16 ft.	29.00
2 x 4 in. to 2 x 12 in., 18 ft.	29.00

Shingles, Lath Roofing, Etc.

XXX B. C. cedar shingles	$4.00 & 3.50 per M
No. 1 pine lath	5.75 per M
Metal lath	.16 to .20
Roofing felt (2-ply)	2.50 per roll

Hardware

Nails, wire, common	$3.70 per keg
Nails, cut, common	3.70
Sash weights, cast iron	2.75 cwt.
Tarred felt paper	1.00 per roll
Building paper	.75
Insulating paper	1.25

Glass

United inches	Single	Double
Up 25	$6.00	8.00
26-40	6.50	9.00
41-50	7.00	10.25
51-60	7.50	11.00
61-70	8.00	11.75
71-80	8.50	12.75
81-85		15.75
86-90		16.75
91-95		17.75
96-100		21.00
101-105		23.50
106-110		27.00

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	$25.00 to 50.00
No. 1 dry pressed buff bricks	30.00 to 40.00
Red stock bricks	25.00
Sand lime brick	12.00
Porous terra cotta bricks	18.00 per M
No. 1 enamelled bricks, all colors, from	100.00
Fire brick	52.50
Oriental brick	35.00
Sewer pipe, 4 inch	.11 per ft.
Sewer pipe, 6 inch	.18½ per ft.

Cement, Plaster, Stone, Etc.

Cement (bags extra)	$2.60 per bbl.
Sand, for cement or brick work	1.85 a yard
Lime	.34 per bu.
Hydrated lime	12.00 per ton
Mortar color	.05 per lb.
Plaster of paris	.75 per bag
Crushed stone, 2 in.	2.65 per yard
Crushed stone, 1 in.	2.90

NOTE TO READERS. We would be glad to have suggestions from readers as to the extension or modification of this list.

Professional Directory

Architects, Engineers, Patent Attorneys, Etc.

Price List of Building Materials—*Continued.*

Price at Winnipeg—*Continued*

Crushed stone, ⅜ in.	2.90
Hardwall plaster	13.00 per ton
Gravel	1.85 per yard
Hair (plaster)	1.25 per bale

PRICE AT VANCOUVER

Shingles, Lath Roofing, Etc.

XXX B. C. cedar shingles	$2.20 & 2.10 per M
No. 1 pine lath	2.25 per M

Hardware

Nails, wire, common	$3.25 per keg
Nails, cut, common	4.25
Tarred felt paper	.90 per roll
Building paper	.70

Price at Vancouver—*Continued*

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	$42.00 per M
No. 1 dry pressed buff bricks	42.00
Red stock bricks	13.00
Fire brick	45.00
Sewer pipe, 4 inch	.25 per ft.

Cement, Plaster, Stone, Etc.

Cement (bags extra)	$3.00 per bbl.
Lime	1.35 per bbl.
Hydrated lime	4.25 per bbl.
Plaster of paris	4.50 per bbl.
Hardwall plaster	14.50 per ton
Hair (plaster)	14.50 per ton

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